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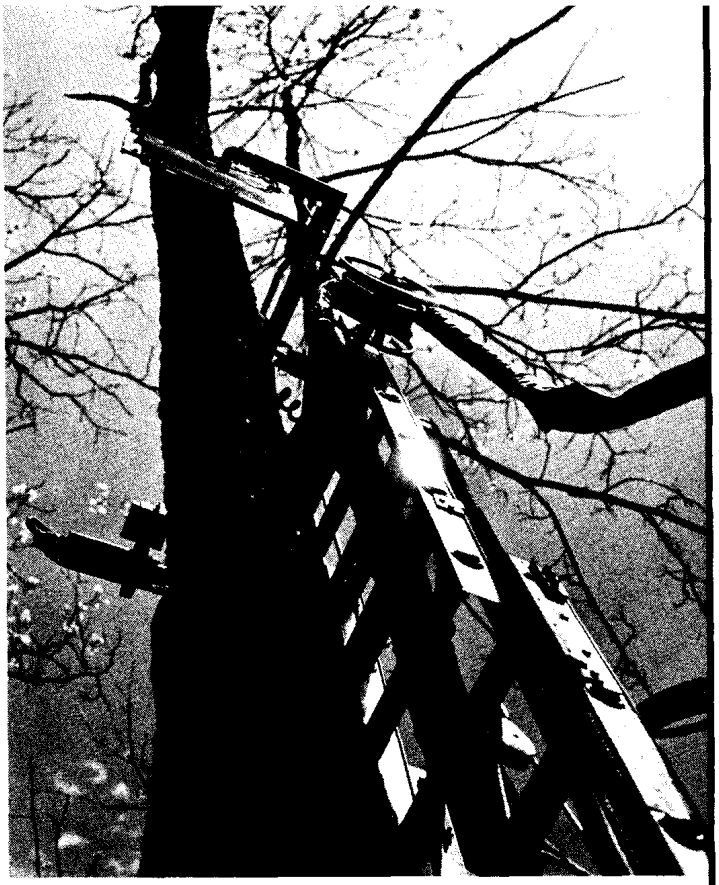
Photo
Story
No. 17

X-RAY UNIT HELPS DIAGNOSE TREE PROBLEMS

Photo Story Number 17

The x-ray equipment is mounted on an all-terrain vehicle for mobility in the woods.

It can easily be positioned to make x-rays along a tree trunk.



X-rays help diagnose human illness.

X-rays may soon be equally indispensable in diagnosing the internal condition of trees.

Because defects and decay in wood have different densities from healthy wood, forestry scientists have found it possible to make radiographic photographs with good contrast and detail by passing x-rays through a tree onto film. With radiographs for viewing, foresters will no longer have to cut and dissect a tree to get disease and defect information; nor will they have to rely on an inaccurate system of predicting internal problems by external indicators, such as branch stubs and insect entry holes.

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Upper Darby, Pennsylvania 19082

X-RAY UNIT HELPS DIAGNOSE TREE PROBLEMS

The possibility of penetrating trees with x-rays was established by scientists more than 40 years ago. Yet the process was never adopted by foresters because of a lack of practical equipment. Until now, the only x-rays units at their disposal have been the cumbersome and stationary medical types, impossible to use in the field.

Because of the problem, Forest Service Plant Pathologist Frederick H. Berry and Research Technician John A. Beaton of the Northeastern Forest Experiment Station, and Entomologist William B. White of the Northeastern Area, State and Private Forest Pest Control Unit in Delaware, Ohio, instigated development of a mobile field x-ray unit to meet their specifications.

According to the Forest Service researchers, this mobile field x-ray unit holds promise of helping tree pathologists and entomologists diagnose the extent of decay and defect in a tree. It offers many other possible benefits. For example, with this unit scientists could reexamine test trees at a later date; city arborists could determine whether trees along their streets and in recreation areas are safe; shade tree companies would be able to decide if homeowners' trees are sound or in need of surgery; and lumbermen would know the quality of trees they want to purchase for veneer or high-grade products before cutting.

The unit can also be used for looking into the condition of existing utility poles, pilings, and other wood products.

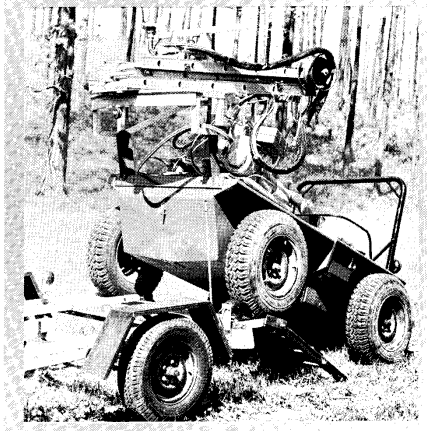
This 100 kilovolt portable x-ray unit, together with a gasoline-powered 3,000-watt alternator, is mounted on an all-terrain vehicle. Its x-ray tube and film holder are mounted on a hoist that can be positioned accurately so that radiographs can be taken along the length of the tree trunk, regardless of terrain. This positioning device is elevated by means of a manually-operated winch and pulley system located on a sliding ladder assembly that adjusts 30° to either side to allow for unevenness of the ground or cant of the tree. The ladder assembly also tilts forward or backward to allow for trees leaning toward or away from the unit.

The mobile field x-ray unit, under investigation by Forest Service personnel, is transported to the woods on a trailer that is hitched to a specially-designed camper darkroom. The darkroom with its own power generator will make it possible to develop x-rays on the spot within minutes, thus providing instant information on a tree's condition.

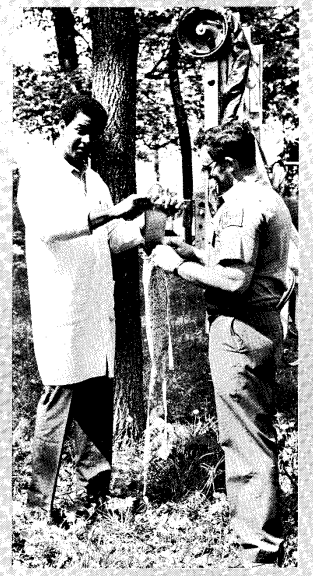
Forest Service researchers John A. Beaton (l.) and Frederick H. Berry (r.) drive the all-terrain vehicle into position in the woods.

Lead shields are placed on the vehicle. These shields protect the operator from radiation while the x-ray unit is operating.

The portable field x-ray unit is mounted on an all-terrain vehicle, shown here being unloaded from the trailer.



An x-ray plate can be set in place either by mounting to a rigid holder on the unit, (photo below) or by encasing in a flexible holder tied to the tree, as demonstrated by Mel Reid (l.) and John Beaton (r.) (see photo right).



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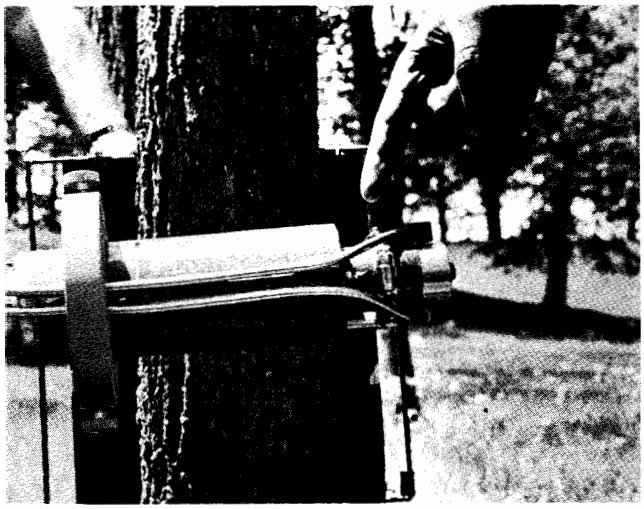
Determining the tree's diameter is important in order to obtain quality x-rays from exposure tables developed by the Forest Service researchers.

X-rays pass from this tube through the tree. A permanent photographic record is then obtained from the x-ray plate on the other side of the tree trunk.



The unit features an automatic x-ray exposure shut-off to prevent over- or under- exposure. In addition to lead shields to protect the operator against exposure to radiation, the unit's tube head is fitted with a collimator that reduces the size of the beam of primary radiation.

The present unit is limited to trunk thicknesses of about 12 inches and heights of 16 feet. Trees of larger diameter could be radiographed with this unit by using faster films and/or intensifying screens.

It is easily transported by means of a trailer. The unit's usefulness in the woods is heightened by outfitting a truck with a camper-darkroom. This allows for momentary determination of a tree's internal characteristics.

The scientists are presently perfecting the unit's capabilities through field tests. Their major testing will be done on the Bald Rock Experimental Forest near London, Kentucky, where in 1965, trees were inoculated with decay fungi.

By taking radiographs of these trees, then cutting and dissecting them, they will be able to compare their radiographic interpretations with the actual extent and position of decay and other defects in the trees. This comparison will, hopefully, verify the accuracy of the x-ray diagnostic process.

The 100 kilovolt portable x-ray unit in operation.

Once the system is thoroughly tested, forestry science should have as valuable a diagnostic tool in x-rays as they have proven to be in the medical field.